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<p>(54) Title: MANHOLE COVER ASSEMBLY WITH A LOCKING MEANS</p>		
<p>(57) Abstract</p> <p>The present invention relates to a manhole cover assembly having a locking means which comprises a manhole frame, a manhole cover, a hinge (130) wherein the manhole frame and the manhole cover is held, and a locking part (140) fastening the manhole frame and the manhole cover. The locking part (140) having a circular arc shape, installed on the lower part of the manhole cover (120), is composed of a chuck nut (141) and a protrusion (142) of the manhole frame as shown in the Figure. The chuck nut (141) has C-shape with a long leg (141a) and a short leg (141b) which are prepared to be closed up. The protrusion (142) extending to the inside of a manhole frame (110) is combined by means of fitting into a clearance formed between the long leg (141a) and the short leg (141b). The present invention provides a manhole cover assembly having a locking means, so that a manhole cover can not be detached from a manhole frame, in case that a heavy weight vehicle passes thereon and a sewage flows backward. Therefore, a damage of the manhole cover assembly can be decreased, and also a noise caused by traffic loading and impact is not occurred.</p>		

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Manhole Cover Assembly with a Locking Means

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Field of the Invention

The present invention relates to a manhole cover assembly with a locking means. More particularly, the present invention relates to a manhole cover assembly with a locking means which
10 can reduce noise of the manhole cover caused by traffic loading and impact, and which can not be opened with the exception of repairs and inspection.

Background of the Invention

15 A manhole which is generally square or round is composed of a housing and a manhole cover assembly. The housing can be prepared by pouring a concrete into a form on site, or installing a housing already manufactured at factory. The manhole cover assembly is mounted on the top of the housing, and installed to be
20 in keeping with the level with a layer of paving road, not to obstruct a traffic.

A conventional manhole cover assembly is composed of a manhole cover and a manhole frame. The top end of the manhole frame is installed to fit the level of a layer of paving road, and then
25 the manhole cover is simply mounted thereon. In other words, there is no locking means in order to combine the manhole frame and the manhole cover. The manhole cover and the manhole frame are made of cast iron, so that the ponderous weight thereof can help to keep it on the housing. Accordingly, in case that a light weight
30 vehicle passes on the manhole cover assembly, the manhole cover can resist to the weight, whereas in case of a heavy weight vehicle passes thereon, the manhole cover can be dislocated and deformed due to the reaction against the pressure of the heavy weight vehicle.

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Also, a manhole cover for the use of a sewerage can be detached in case that a sewage flows backward due to a tidal wave, a deluge, etc.

In order to solve the shortcomings caused by having no
5 fastening means, a manhole cover assembly as shown in Figure 1 has been disclosed. A fastening means of the manhole cover assembly is composed of a hinge part and a locking part, so that the manhole cover can not be detached against the reaction of a heavy weight. Namely, a ring of the hinge part and a plumb,
10 which has a reversed trapezoid shape, of the locking part are hung on the manhole frame, not to be detached.

In the manhole cover assembly as described above, there is a clearance between a plumb and a manhole frame, because a combining means of the manhole cover and the manhole frame has
15 a housing in which a plumb is hung on the 15 manhole frame, not to be separated, and thereby a noise can be generated by a heavy weight pressure and a repeated pressure, and a damaged plumb can also cause a detachment of a manhole cover from the manhole frame. That is caused by a clearance between a manhole cover and
20 a manhole frame.

Accordingly, the present inventor have developed a manhole cover assembly with a locking means to solve the shortcomings as mentioned above.

25 Summary of the Invention

An object of the present invention is to provide a manhole cover assembly having a locking means.

Another object of the present invention is to provide a manhole cover assembly in which a manhole cover is not detached
30 from a manhole frame by the reaction against the pressure of a sewage flowing backward.

A further object of the present invention is to provide a manhole cover assembly in which a manhole cover and a manhole

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frame are fastened together, so that a damage of the manhole cover assembly is decreased, and also a noise is not generated therefrom.

A further object of the present invention is to provide a manhole frame which can decrease the damage of the adjacent
5 paving material from a manhole frame.

A manhole cover assembly having a locking means in accordance with the present invention comprises a manhole frame, a manhole cover, a hinge 130 wherein the manhole frame and the manhole cover is held, and a locking part 140 fastening the manhole
10 frame and the manhole cover. The locking part 140 is composed of a chuck nut 141 and a protrusion of the manhole frame. The chuck nut 141 is installed on the lower part of the manhole cover 120, and has a circular arc shape, and in a cross-sectional view of the chuck nut 141, the chuck nut 141 with C-shape having a long leg 141a
15 and a short leg 141b is prepared to be closed up. A protrusion 142 extended from a manhole frame 110 is combined by means of fitting into a clearance formed between the long leg 141a and the short leg 141b.

The present invention provides a manhole cover assembly
20 having a locking means, so that a manhole cover can not be detached from 20 a manhole frame, in case that a heavy weight vehicle passes thereon and a sewage flows backward. Therefore, a damage of the manhole cover assembly can be decreased, and also a noise caused by traffic loads and impact is not occurred.

25

Brief Description of the Drawings

The present invention will be described with reference to the accompanying drawings of which:

Fig. 1 is a plan view(a), an elevation(b) and a cross-sectional
30 view(c) of a conventional manhole cover assembly.

Fig. 2 is a plan view of Example 1 according to the present invention.

Fig. 3 is an elevation of Example 1 according to the present

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is combined with the manhole frame 10 by means of a hinge part 30 and a locking part 40 as shown in Figure 1c. The manhole cover assembly shown in Figure 1 is safer than a general manhole cover assembly without a locking means.

5 But, the manhole cover assembly has a clearance between the upper end of a reversed triangle plumb and the lower end of a rim of a manhole frame, because a manhole cover 20 is mounted on the manhole frame 10 and the reversed triangle plumb is hung to the manhole frame, not to be detached. Accordingly, when a manhole
10 cover is lifted by an impact, a reversed triangle plumb and a rim make a noise by bumping against each other, and thereby a locking part can be easily damaged.

The present invention will be described more specifically by
15 the following examples with appended drawings.

Example 1 in accordance with the present invention is shown in Fig. 2 to Fig. 5.

A manhole cover assembly according to the present invention
20 is composed of a manhole frame 110, a manhole cover 120, a hinge 130 in which the manhole frame and the manhole cover are held, and a locking part 140 fastening the manhole frame and the manhole cover.

The hinge 130 is composed of a hook 131 which is protruded
25 and extended from the manhole cover, a hook sill 132 which is protruded to the center of U-shape hollow in the manhole frame 110, and a clearance 133 which is formed below the hook sill. When the manhole cover 120 is opened, the hook 131 is rotated in the clearance 133 and the hook sill 132 is hung on the lower part,
30 so that the manhole cover is positioned at standing.

The locking part 140 having a circular arc shape, installed on the lower part of the manhole cover 120, is composed of a chuck nut 141 and a protrusion 142 of the manhole frame as shown in

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Figure 5. The chuck nut 141 has C-shape with a long leg 141a and a short leg 141b which are prepared to be closed up. The protrusion 142 extending to the inside of a manhole frame 110 is combined by means of fitting into a clearance formed between the
5 long leg 141a and the short leg 141b.

The chuck nut 141 is made of nodular cast iron, ductile cast iron or spheroidal graphite cast iron. The spheroidal graphite cast iron is prepared by the steps of mixing cast-iron with Mg, Ca, Si, etc. in a melting pot and solidifying the mixture. The strength of
10 spheroidal graphite cast-iron is 40~70kgf/mm², the elongation of that is 5~20%. In the present invention, the reason why the chuck nut can be easily locked and unlocked is that the elongation of the spheroidal graphite cast iron is excellent. A plastic or the like which has an excellent strength and elongation can be used instead
15 of the spheroidal graphite cast iron to prepare a chuck nut.

In the present invention, the chuck nut 141 is prepared to be one body with a manhole cover, therefore, the chuck nut 141 can easily be damaged in handling. A chuck nut is prepared by forging, and then the forged chuck nut is inserted into a mold and preparing
20 a manhole cover having the forged chuck nut.

In order to easily open a manhole cover, a rim of a locking part 144 having C-shape is formed in the locking part of the manhole frame 110, and a clearance of the locking part 143 which is surrounded by rim of the locking part 144 is formed. And a knob
25 145 which is protruded from a manhole cover 120 is formed.

In order to open a manhole cover 120, a metal rod 146 is inserted into a clearance 143 of the locking part which is surrounded by a rim 144 of the locking part, and is pushed downward, and a force is transferred to a knob 145, and the force transferred to the
30 knob 145 is transferred to a chuck nut 141 installed on the lower part of the locking part of the manhole cover, and the chuck nut 141 having a long leg 141a and a short leg 141b is separated from the protrusion 142 of the manhole frame.

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A manhole cover 120 separated from a protrusion 142 is rotated centering around a hinge of Fig. 3, and thus a hook 131 is in a state of hanging on the a hook sill 132.

5 A method of installing a manhole cover is the reverse way of the method of disassembly as described above. And an elastic packing 151 is installed in a circular arc part except a hinge and a locking part in the manhole frame 110, therefore, the weight of a manhole cover weighs down the elastic packing, whereas the elastic packing has a force of restitution, so that there is no
10 clearance between the manhole frame and the manhole cover by incorporating with the locking part 140. Accordingly, a noise caused by traffic loading and impact is not generated, and also the manhole cover is not displaced by the reaction against a ponderous weight.

Fig. 6 shows another hinge of a manhole cover assembly in
15 accordance with the present invention. Fig 6a is a perspective view of a hinge of a manhole cover. Fig 6b is a side view of a hinge thereof. Fig. 6c is a perspective view of a hinge of a manhole frame. Fig. 6d is a plan view and a cross-sectional view taken along with the line C-C.

20 Fig. 6 is a modification of a hinge part of Fig. 4. Generally, when a manhole cover as shown in Fig. 4 is installed on a manhole frame, dust and muck are come into a hinge due to the clearance therein, therefore, it is difficult to open the manhole cover, or to repair and inspect.

25 A modified hinge of a manhole cover assembly as shown in Fig. 6 is composed of a hinge part 31 of a manhole cover and a hinge part 32 of a manhole frame.

The hinge part 31 of a manhole cover as shown in Fig 6a is extended at a level with the manhole cover, and has a trapezoid
30 shape as shown in Fig. 6b. The hinge part 31 is hung to protrusions 33 which are formed in a hinge part of a manhole frame in Fig. 6c.

The hinge part 32 of a manhole frame as shown in Fig. 6c

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has a clearance to accomodate the hinge part 31 of a manhole cover, and two protrusions 33 are formed on both sides. And a rectangular hole 34 is formed on the lower part of the hinge part 32 of the manhole frame so that dust and muck can flow out through it. Also, there is an incline plan 35 to slip it down.

Example 2 of the present invention is shown in Fig. 7 and Fig. 8. A conventional manhole cover assembly does not provide a means to prevent a rotation of a manhole cover when installed on the frame. Accordingly, a manhole cover assembly in accordance with the present invention is designed to solve a risk of separation of the manhole cover caused by traffic loading and impact.

In a manhole cover assembly having an elastic packing 251 installed between a manhole frame 210 and a manhole cover 220, the manhole frame 210 is composed of a lower part 211 which makes contact with a housing, a vertical part 212 which is extended vertically from the end of the inside of the lower part, and a support part 213 having U-shape which is protruded from the center of the inside of the vertical part 212. In the inside of the vertical part 212 of the manhole frame 210, a plurality of a semicircle prominence are formed, and also a semicircle depression 232 is formed to fit in the semicircle prominence 231. A device 230 for a rotating prevention is composed of a semicircle prominence 231 of a manhole frame and a semicircle depression 232 of a manhole cover. It is preferred that at least two devices 230 of a rotating prevention should be installed to prevent a rotation of the manhole cover 220.

An elastic packing 251 is installed in a depression having U-shape which formed between a support part 213 and a vertical part 212 of a manhole frame 210 in order to restrain a noise generation and cushion an impact.

A pair of semicircle depressions are formed on a manhole frame and a manhole cover so as to easily install and disassemble the manhole cover. A hole 241 formed by a pair of semicircle

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depressions is used to disassemble a manhole cover from a manhole frame. When a metal rod is inserted in the hole 241 and pushed down, the manhole cover is easily opened.

5 Example 3 of the present invention is shown in Fig. 9 and Fig. 10. In this example, a magnet is installed in a clearance which is formed on the upper end of the support part in Example 2 (Fig. 7 and Fig. 8).

 A magnet is installed to prevent a detachment of a manhole
10 cover due to traffic loading and impact in parallel as well as in vertical to the manhole cover in Example 2.

 A locking part 340 using a magnet has a hollow 342 formed on the upper end of a support part 213 of a manhole frame to accomodate a magnet therein. A tabular magnet 341 is fixed by
15 means of using an adhesive agent and a caulking compound such as a silicon sealant or the like, and an elastic packing 251 is installed on a hollow having U-shape formed on the support part 213. The elastic packing 251 plays a role to cushion an impact against a load taken on a manhole cover and functions to protect a magnet from a
20 damage.

 It is desirable that at least two locking parts 340 using a magnet is installed, and each locking part is installed at regular intervals.

 Example 3 can be applied by modifying Example 1. In place
25 of a locking part in Example 1, a magnet 341 and a hole 241 for the use of disassembling are combined, so that the manhole cover is fastened with a manhole frame by means of a magnetic force and an elasticity of a elastic packing. Accordingly, a manhole cover assembly in accordance with the present invention is composed of a
30 manhole frame 110, a manhole cover 120, a hinge 130 wherein a manhole frame and a manhole cover is held therein, and a locking part 340 with a magnet fixing a manhole frame and a manhole cover.

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Figure 11 is a plan view showing Example 4 in accordance with the present invention. Example 4 is that a hinge 130 of Example 1(Fig. 4) and a means for a rotating prevention 230 of Example 2(Fig. 7 and Fig. 8) are combined.

5 Figure 12 is a plan view showing Example 5 in accordance with the present invention. Example 5 is that a prominence and a depression for the use of a means 230 for a rotating prevention are formed in turns on a manhole frame and a manhole cover, in addition to a combination of a hinge 130 of Example 1(Fig. 4) and a
10 means for a rotating prevention 230 of Example 2(Fig. 7 and Fig. 8).

Also, a various modification of the present invention can be carried out. For example, in order to improve a stability of the combination of a manhole cover and a manhole frame in Example 4
15 of Figure 11 and Example 5 of Figure 12, a locking part 340 using a magnet, applied in Example 3 of Fig. 9 and Fig. 10, can be applied thereto.

Figure 13 shows a manhole frame which is a modification of a conventional manhole frame.

20 A vertical part of a conventional frame is formed as I-shape. The upper end of a vertical part and a layer of a roadway are paved to be kept the same level. The layer of a roadway is easily damaged because the vertical part is perpendicular thereto, therefore, a broken piece of a paved road can cause lots of accidents.

25 A manhole frame in accordance with the present invention has an extension part on the upper end of a vertical part thereof. The extension part has a curved surface, so that the curved surface of the extension part can contact with more paving materials more than a vertical part of a conventional manhole frame.

30 An extension part 214 is formed as extending the upper end of a vertical part 212 of the manhole frame 210 to the outside of the vertical part 212 of a manhole frame 210, and a upper part and a lower part of an extension part 214 are formed as a curved

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surface.

5 The present invention provides a manhole cover assembly having a locking means, so that a manhole cover can not be detached from a manhole frame, in case that a heavy weight vehicle passes thereon and a sewage flows backward. Therefore, a damage of the manhole cover assembly can be decreased, and also a noise caused by traffic loading and impact is not occurred.

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What is claimed is:

1. A manhole cover assembly comprising:
a manhole frame;
a manhole cover;
a hinge 130 wherein said manhole frame and said manhole cover is held; and
a locking part 140 fastening said manhole frame and said manhole cover;
wherein the locking part 140 having a circular arc shape, installed on the lower part of the manhole cover 120, is composed of a chuck nut 141 and a protrusion 142 of the manhole frame, in which the chuck nut 141 has C-shape with a long leg 141a and a short leg 141b which are prepared to be closed up, and the protrusion 142 extending to the inside of a manhole frame 110 is combined by means of fitting into a clearance formed between the long leg 141a and the short leg 141b.
2. The manhole cover assembly as defined in claim 1 wherein said chuck nut 141 is made of spheroidal graphite cast iron.
3. The manhole cover assembly as defined in claim 1 wherein further includes a rim 144 of a locking part having C-shape which is formed in a manhole frame 110, a clearance 143 of the locking part which is surrounded by said rim 144 thereof, and a knob 145 which is protruded from a manhole cover 120.
4. A manhole frame comprising:
a lower part 211 which makes contact with a housing;
a vertical part 212 which is extended vertically from the end of the inside of the lower part;
a support part 213 having U-shape which is protruded from the center of the inside of said vertical part 212; and
an extension part 214 which is formed as extending the upper end

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of a vertical part 212 of the manhole frame 210 to the outside of the vertical part 212 of a manhole frame 210, wherein a upper part and a lower part of said extension part 214 are formed as a curved surface.

5. A manhole cover assembly comprising:

a manhole frame 210 which is composed of a lower part 211 which makes contact with a housing, a vertical part 212 which is extended vertically from the end of the inside of the lower part, and a support part 213 having U-shape which is protruded from the center of the inside of the vertical part 212, wherein a plurality of a semicircle prominence 231 are formed in the inside of the vertical part 212;

a manhole cover 220 in which a semicircle depression 232 is formed to fit in said semicircle prominence 231 of said manhole frame 210;

a hole 241 which is formed by a pair of semicircle depressions in said manhole frame 210 and said manhole cover 220; and

an elastic packing 251 which is installed between said manhole frame 210 and said manhole cover 220.

6. The manhole cover assembly as defined in claim 5 wherein further includes a hollow 342 formed on the upper end of said support part 213 of a manhole frame to accomodate a magnet therein, and a locking part 340 using a magnet wherein a tabular magnet 341 is fixed on said hollow 342.

7. The manhole cover assembly as defined in claim 5 wherein said manhole frame 210 further includes an extension part 214 which is formed as extending the upper end of a vertical part 212 of the manhole frame 210 to the outside of the vertical part 212 of a manhole frame 210, wherein a upper part and a lower part of an extension part 214 are formed as a curved surface.

8. A manhole cover assembly comprising:

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a manhole frame 210 which is composed of a lower part 211 which makes contact with a housing, a vertical part 212 which is extended vertically from the end of the inside of the lower part, and a support part 213 having U-shape which is protruded from the center of the inside of the vertical part 212, wherein a semicircle prominence 231 and a semicircle depression are formed by turns in the inside of the vertical part 212;

a manhole cover 220 in which a semicircle depression 232 is formed to fit in said semicircle prominence 231 of said manhole frame 210;

a hole 241 which is formed by a pair of semicircle depressions in said manhole frame 210 and said manhole cover 220; and

an elastic packing 251 which is installed between said manhole frame 210 and said manhole cover 220.

9. The manhole cover assembly as defined in claim 8 wherein further includes a hollow 342 formed on the upper end of said support part 213 of a manhole frame to accomodate a magnet therein, and a locking part 340 using a magnet wherein a tabular magnet 341 is fixed on said hollow 342.

10. The manhole cover assembly as defined in claim 8 wherein said manhole frame 210 further includes an extension part 214 which is formed as extending the upper end of a vertical part 212 of the manhole frame 210 to the outside of the vertical part 212 of a manhole frame 210, wherein a upper part and a lower part of an extension part 214 are formed as a curved surface.

11. A manhole cover assembly comprising:

a manhole frame 210 which is composed of a lower part 211 which makes contact with a housing, a vertical part 212 which is extended vertically from the end of the inside of the lower part, and a support part 213 having U-shape which is protruded from the center of

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the inside of the vertical part 212;

a manhole cover 120;

a hinge 130 wherein said manhole frame 210 and said manhole cover 120 is held; and

a locking part 340 with a magnet, wherein a hollow 342 is formed on the upper part of said support part 213 of said manhole frame to accomodate a magnet therein, and a tabular magnet 341 is fixed on said hollow 342.

12. The manhole cover assembly as defined in claim 11 wherein said manhole frame further includes an extension part 214 which is formed as extending the upper end of a vertical part 212 of the manhole frame 210 to the outside of the vertical part 212 of a frame 210, wherein a upper part and a lower part of an extension part 214 are formed as a curved surface.

13. A manhole cover assembly comprising:

a manhole frame;

a manhole cover;

a hinge wherein the manhole frame and the manhole cover is held; and

a locking part fastening said manhole frame and said manhole cover;

wherein said hinge is composed of a hinge part 31 of a manhole cover and a hinge part 32 of a manhole frame, wherein said hinge part 31 is extended at a level with said manhole cover, and has a trapezoid shape, and is hung to a protrusion 33 which is formed in said hinge part 32 of said manhole frame, and said hinge part 32 of said manhole frame has a clearance to accomodate said hinge part 31 of said manhole cover, and two protrusions 33 are formed on both sides, and a rectangular hole 34 is formed on the lower part of said hinge part 32 of said manhole frame, and also there is an incline plan 35 to slip it down.

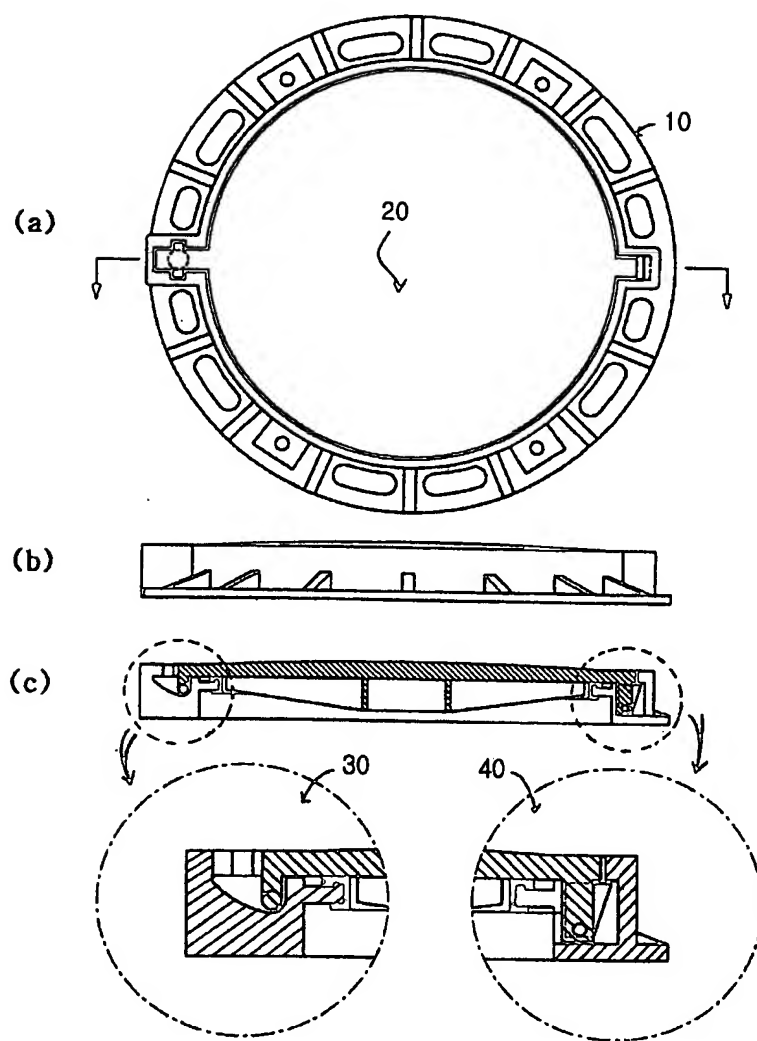
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14. The manhole cover assembly as defined in claim 13 wherein further includes a rim 144 of a locking part having C-shape which is formed in a manhole frame 110, a clearance 143 of the locking part which is surrounded by said rim 144 thereof, and a knob 145 which is protruded from a manhole cover 120.

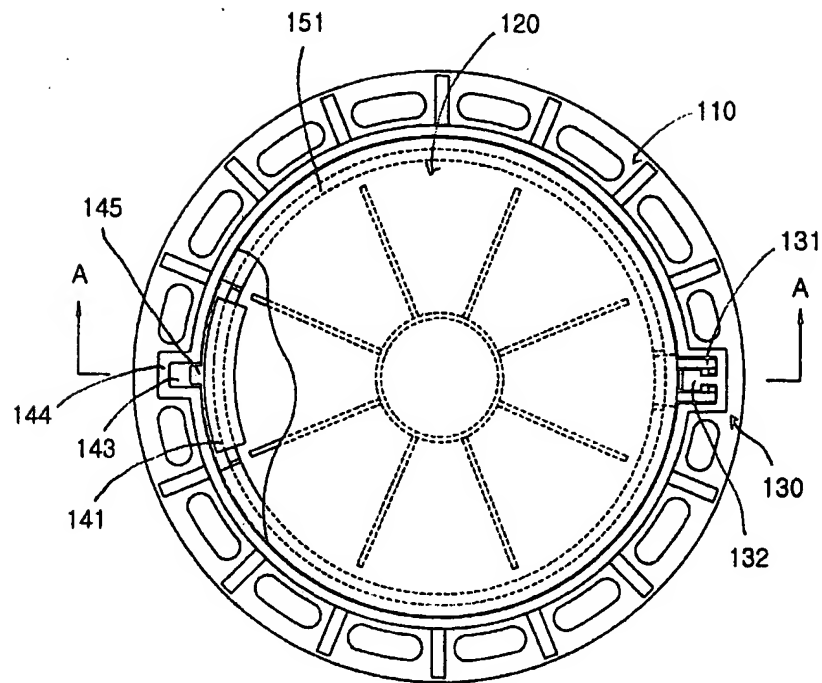
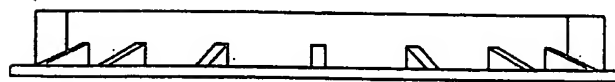
15. The manhole cover assembly as defined in claim 13 wherein said locking part is composed of a chuck nut 141 and a protrusion 142 of said manhole frame, in which said chuck nut 141 has C-shape with a long leg 141a and a short leg 141b which are prepared to be closed up, and said protrusion 142 extending to the inside of a manhole frame 110 is combined by means of fitting into a clearance formed between the long leg 141a and the short leg 141b.

16. The manhole cover assembly as defined in claim 15 wherein said chuck nut 141 is made of spheroidal graphite cast iron.

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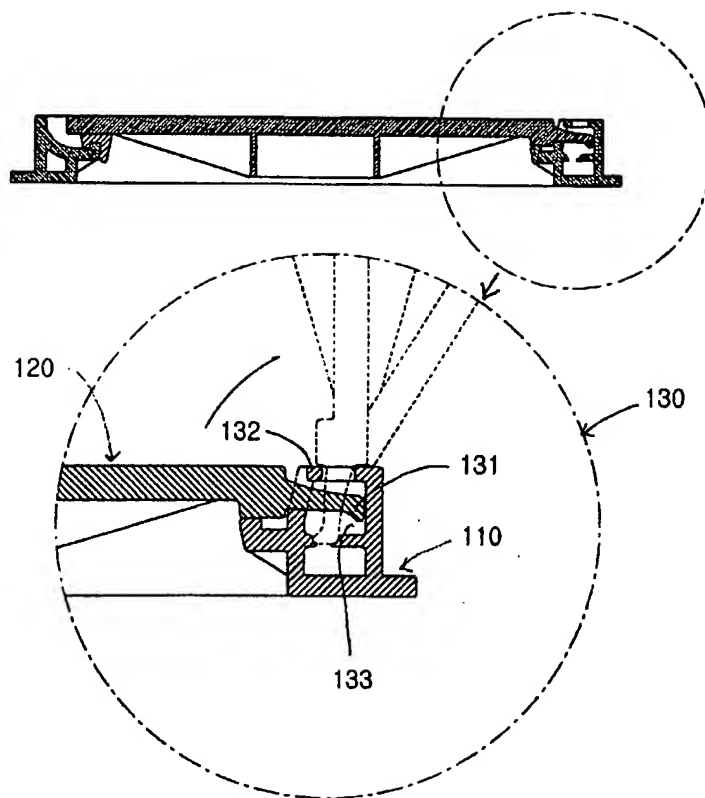
Fig. 1

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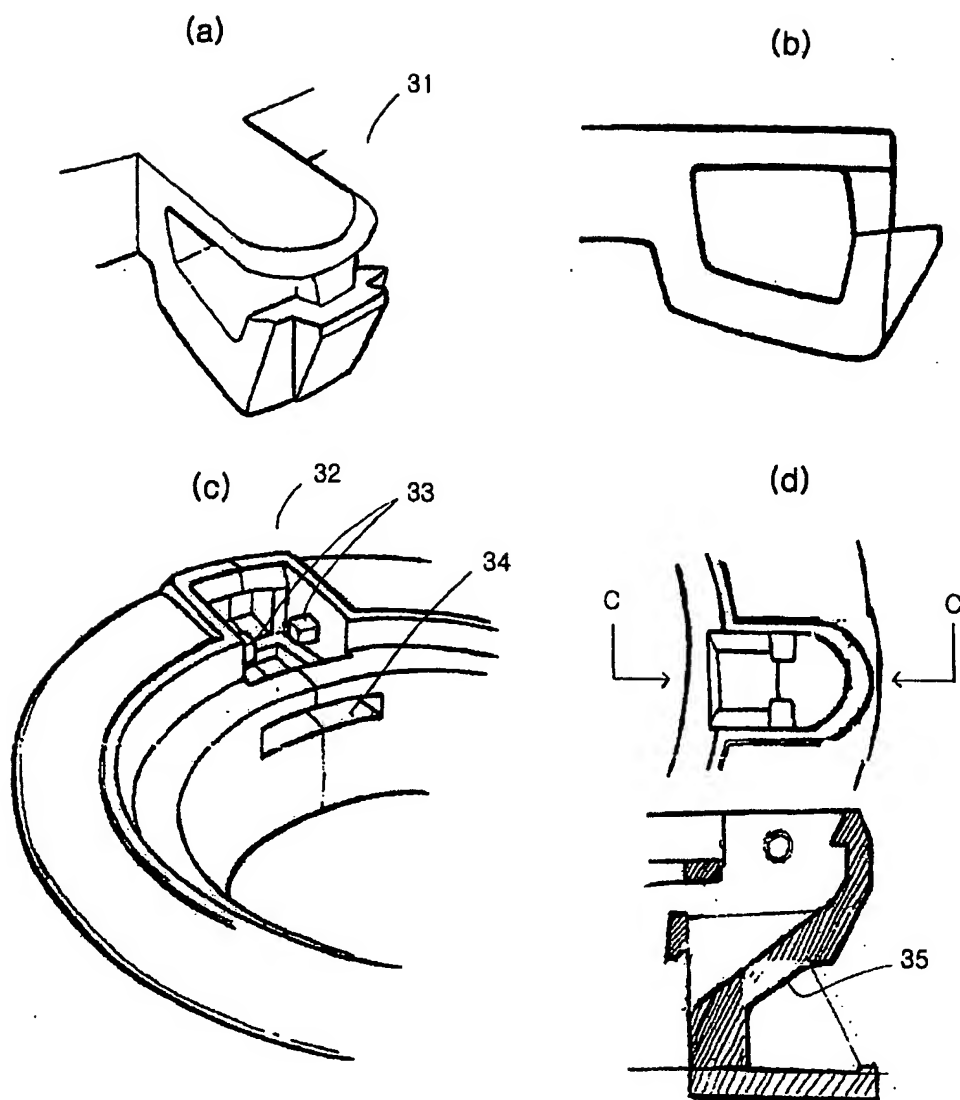
Fig. 2*Fig. 3*

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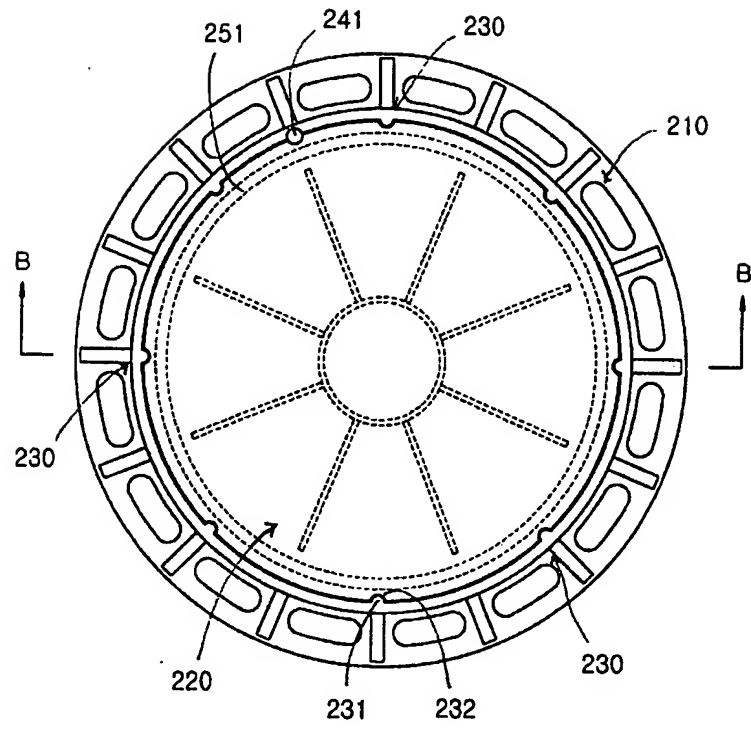
Fig. 4



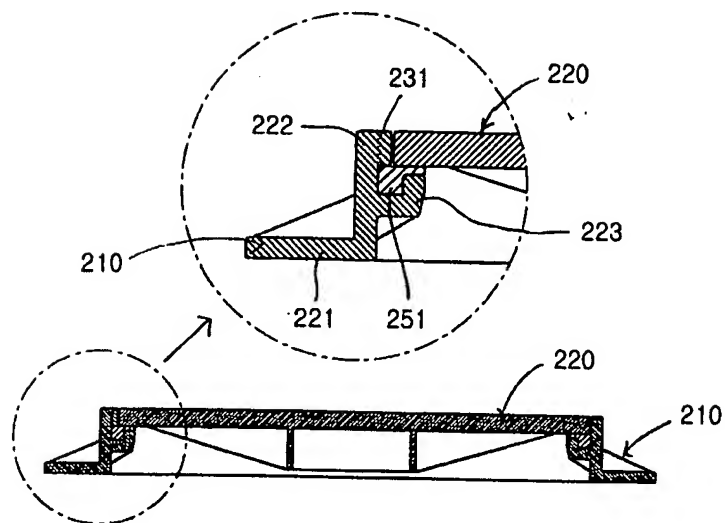
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Fig. 6

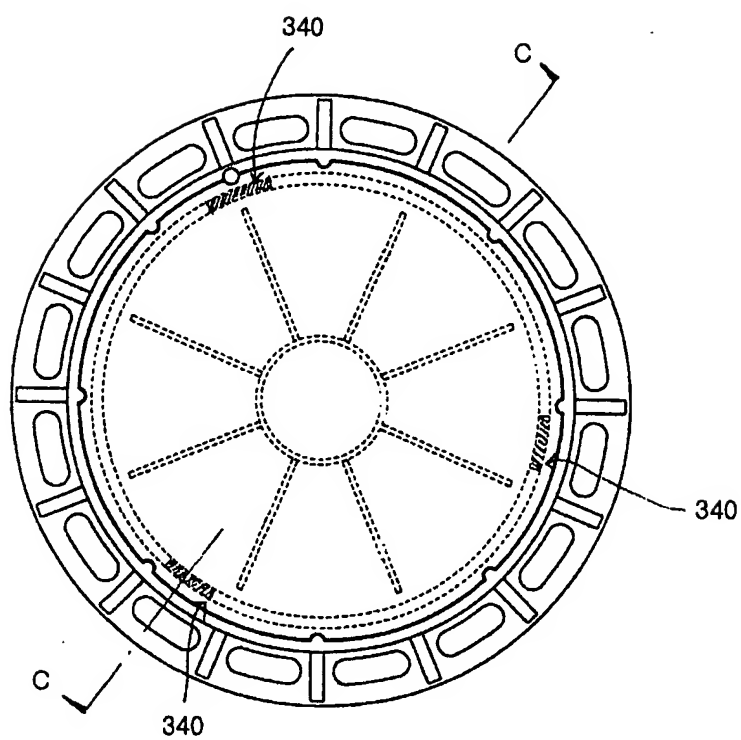
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Fig. 7

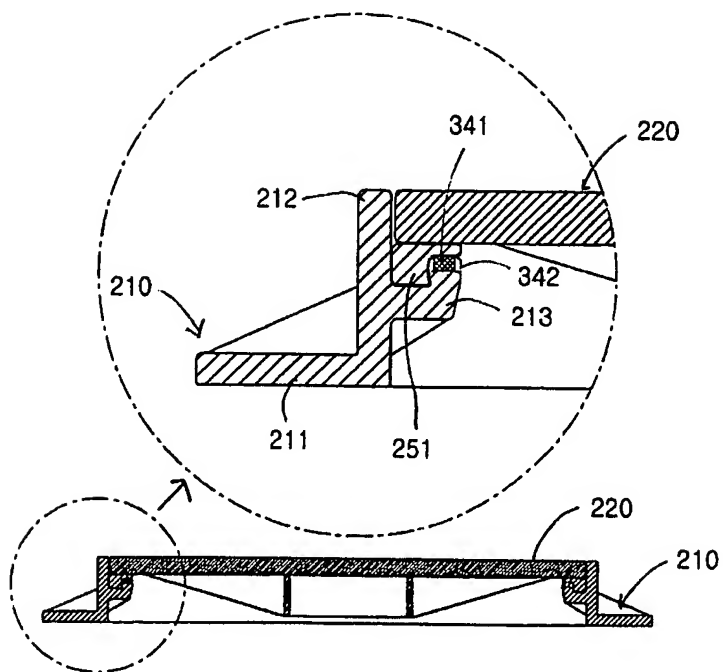
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Fig. 8

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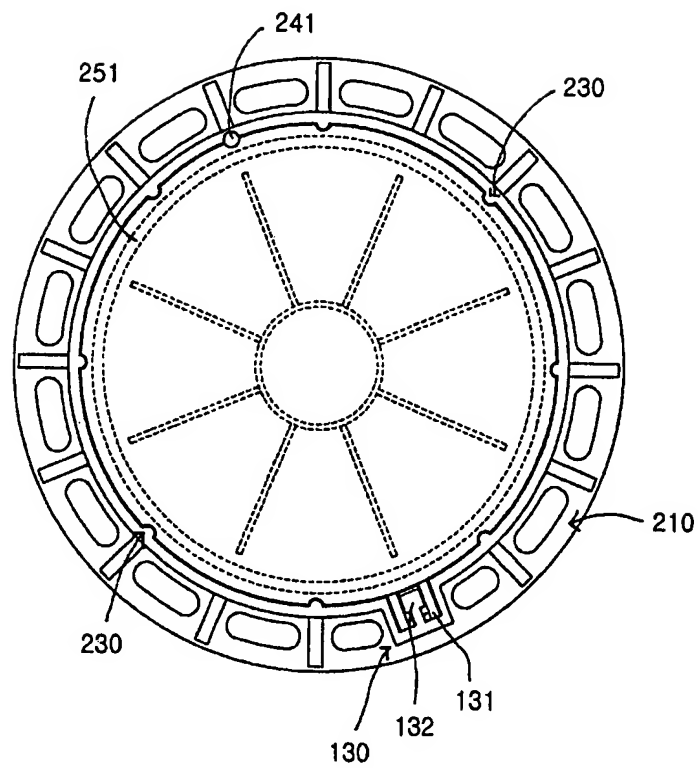
Fig. 9

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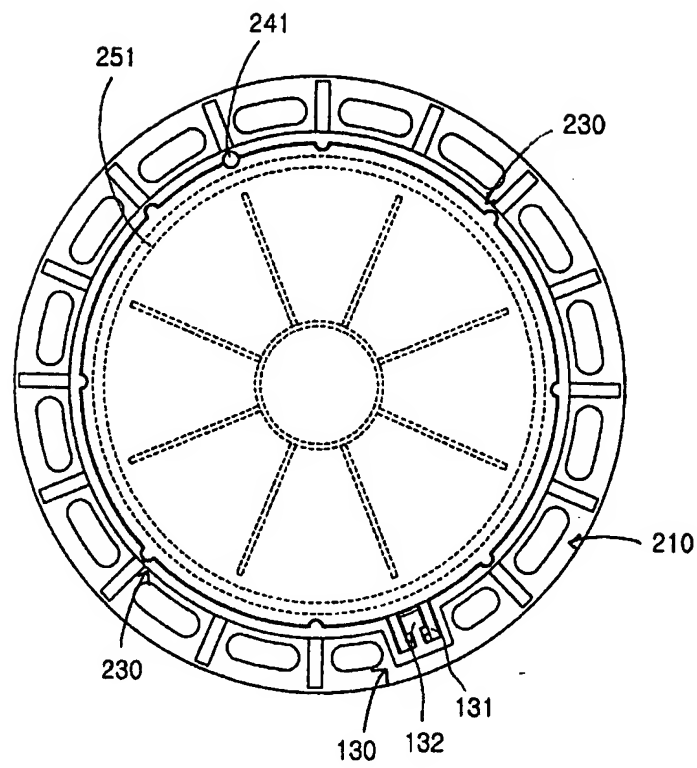
Fig. 10

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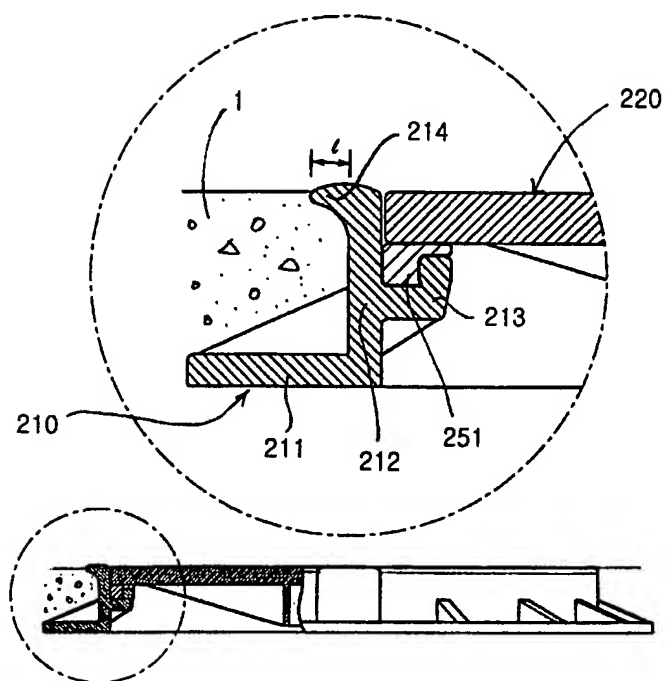
Fig. 11



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Fig. 12

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Fig. 13

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR 99/00474

A. CLASSIFICATION OF SUBJECT MATTER

IPC⁷: E02D 29/14

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC⁷: E02D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 200008 A1 (PONT-A-MOUSSON) 05 November 1986 (05.11.86), reference numbers 18, 19 and 21.	1,15
A	GB 2242219 A (TRIMAN INVESTMENTS), 25 September 1991 (25.09.91), fig. 13.	1,15
A	DE 7536729 U (M. STREICHER) 25 March 1976 (25.03.76), fig. 1	3,14
X	DE 3841213 A1 (PASSAVANT-WERKE) 13 June 1990 (13.06.90), fig. 1	4
X	GB 1592438 A (RAATJES) 08 July 1981 (08.07.81), reference numbers 17, 41 and 42.	5,8
X	EP 0 451964 A1 (MONNERET) 09 October 1991 (08.10.91), totality.	13

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

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„&“ document member of the same patent family

Date of the actual completion of the international search

23 November 1999 (23.11.99)

Date of mailing of the international search report

21 January 1999 (21.01.99)

Name and mailing address of the ISA/AT
Austrian Patent Office
Kohlmarkt 8-10; A-1014 Vienna
Facsimile No. 1/53424/200

Authorized officer

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Telephone No. 1/53424/342

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR 99/00474

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